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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/920,762	08/03/2001	Takashi Kitaguchi	212135US2	5946

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EXAMINER	
STOCK JR, GORDON J	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/920,762	KITAGUCHI ET AL.
	Examiner	**Art Unit**
	Gordon J. Stock	2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 16 February 2006.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-34 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-34 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 September 2005 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

1. The Amendment received on February 16, 2006 has been entered into the record.

Claim Objections

2. **Claims 33-34** are objected to for the following: the claims depend upon claim 30 which is a shape measurement method and not a computer readable medium. Examiner has interpreted claims 33-34 as depending from claim 20. Corrections are required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. **Claims 1, 4, 5, 10-15, 21-24, 27-30,** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Geng (6,700,669)** in view of **Kumar et al. (6,522,787)-previously cited.**

As for **claims 1, 5, 10, 13, 15,** Geng in a method and system for three dimensional imaging using light patterns having multiple sub-patterns discloses the following: a plurality of picture taking parts with different optical centers taking pictures of the object (Fig. 11: left and right CCD cameras); a projecting part applying light having a predetermined pattern onto the object (Fig. 11: 1 with multiple rainbow projection pattern); a three-dimensional coordinate calculating part calculating a three-dimensional coordinate of each point of the object for each image based on a plurality of images obtained as a result of pictures of the object being taken by said plurality of picture taking parts and a three-dimensional shape composing part expressing,

by a coordinate in a single coordinate system, a three dimensional coordinate of each point of the object calculated by said three-dimensional coordinate calculating part for at least two different positions, such as the two locations of the cameras, and to produce a composed image (Figs. 12a-12b; Fig. 11: host computer; col. 6, lines 49-67; Fig. 9; and col. 7, lines 29-63 with col. 2, lines 35-45). Geng does not explicitly state a picture taking position-specifying part but he discloses a geometrical parameter calibration part (col. 7, lines 50-55). Kumar in an imaging system teaches a picture taking position-specifying part, a correction part comprising a position sensor (Fig. 4: 412 and 416). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a position specifying part in order to correct for the position of the camera when calculating three dimensional coordinates of the object being imaged.

As for **claims 4, 12, and 14,** Geng in evidence of Kumar discloses everything as above (see **claims 1, 10, and 13**) In addition, Geng discloses a three-dimensional image generating part generating a three-dimensional image of the object in accordance with coordinates of the object obtained and an image obtained when the light having the predetermined pattern is not applied to the object with a sequential projection of individual color bands (Fig. 12a).

As for **claim 11**, Geng in evidence of Kumar discloses everything as above (see **claim 10**). In addition, Geng discloses at least one control signal, a frame rate, provided externally by host computer and real-time frame grabber board (Fig. 11: 5 and 6 and col. 7, lines 63-65).

As for **claims 21-24 and 27-30**, Geng in evidence of Kumar discloses everything as above (see **claims 1, 5, 13 and 15**). In addition, Geng discloses the calculation of attitudes angles, translation and rotational components by a calibration step of geometric parameters and angle and range calculations (col. 7, lines 45-60). In evidence Kumar in an imaging system

teaches with calibration the calculation of rotations, translations, and attitudes, position, roll, pan, tilt, and zoom (col. 7, lines 55-67).

5. **Claims 2, 3 and 6** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Geng (6,700,669)** in view of **Kumar et al. (6,522,787)-previously cited** further view of **Hallioua (4,657,394).**

As for **claims 2 and 6,** Geng in view of Kumar discloses everything as above (see claims 1 and 5). Geng also discloses a frame rate control (col. 7, lines 63-65) and real-time frame grabber board and storing part, a host computer (Fig. 11: 5 and 6). Geng is silent concerning analog to digital conversion; however, the picture data is sent to the computer (Fig. 11: 4-6). Hallioua in an apparatus for obtaining 3D surface contours teaches analog to digital conversion of camera data to computer (col. 13, lines 15-25). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have an analog to digital converter in order to have the host computer process the camera data.

As for **claim 3**, Geng in view of Kumar and in view of Hallious discloses everything as above (**claim 2**). Geng is silent concerning interpolation of data. However, Kumar in a system for combining images teaches interpolating data (col. 11, lines 30-42). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have an interpolation part to accommodate for the various light levels in the plurality of patterns being used when composing the image.

6. **Claims 7-9, 25, 26,** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Geng (6,700,669)** in view of **Kumar et al. (6,522,787)-previously cited** further in view of **Hallioua (4,657,394)** further in view of **Katayama et al. (6,640,004).**

As for **claim 7**, Geng in a method and system for three dimensional imaging using light patterns having multiple sub-patterns discloses the following: a plurality of picture taking parts with different optical centers taking pictures of the object (Fig. 11: left and right CCD cameras); a projecting part applying light having a predetermined pattern onto the object (Fig. 11: 1 with multiple rainbow projection pattern); a three-dimensional coordinate calculating part calculating a three-dimensional coordinate of each point of the object for each image based on a plurality of images obtained as a result of pictures of the object being taken by said plurality of picture taking parts and a three-dimensional shape composing part expressing, by a coordinate in a single coordinate system, a three dimensional coordinate of each point of the object calculated by said three-dimensional coordinate calculating part for at least two different positions, such as the two locations of the cameras, and to produce a composed image with a host computer (Figs. 12a-12b; Fig. 11: host computer; col. 6, lines 49-67; Fig. 9; and col. 7, lines 29-63 with col. 2, lines 35-45). Geng does not explicitly state a picture taking position-specifying part but he discloses a geometrical parameter calibration part (col. 7, lines 50-55). Kumar in an imaging system teaches a picture taking position-specifying part, a correction part comprising a position sensor (Fig. 4: 412 and 416). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a position specifying part in order to correct for the position of the camera when calculating three dimensional coordinates of the object being imaged.

As for having the projecting part incorporated into the picture-taking device, Geng is silent. However, Katayama in an image sensing and image processing apparatus teaches the integration of cameras with projectors (Fig. 2: 1). Therefore, it would be obvious to one of ordinary skill in the art to integrate the cameras with the projector to have a more compact system.

As for **claim 8**, Geng in evidence of Kumar and in view of Katayama discloses everything as above (see **claim 7**). Geng is silent concerning an interpolation part. However, Katayama teaches an interpolation part (col. 27, lines 30-47). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have an interpolation part to combine information from both cameras to produce a composed image.

As for **claim 9**, Geng in evidence of Kumar and in view of Katayama discloses everything as above (see **claim 7**). In addition, Geng discloses at least two control signals, a frame rate and projection pattern, provided externally by host computer and real-time frame grabber board (Fig. 11: 5 and 6 and col. 7, lines 63-65).

As for **claims 25 and 26**, In addition, Geng in evidence of Kumar and in view of Katayama discloses everything as above (see **claim 7**). In addition Geng discloses the calculation of attitudes angles, translation and rotational components by a calibration step of geometric parameters and angle and range calculations (col. 7, lines 45-60). In evidence Kumar in an imaging system teaches with calibration the calculation of rotations, translations, and attitudes, position, roll, pan, tilt, and zoom (col. 7, lines 55-67).

7. **Claims 16, 19, 20, and 31-34** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Geng (6,700,669)** in view of **Kumar et al. (6,522,787)-previously cited** further in view of **Katayama et al. (6,640,004).**

As for **claims 16 and 20**, Geng in a method and system for three dimensional imaging using light patterns having multiple sub-patterns discloses the following: a plurality of picture taking parts with different optical centers taking pictures of the object (Fig. 11: left and right CCD cameras); a projecting part applying light having a predetermined pattern onto the object

(Fig. 11: 1 with multiple rainbow projection pattern); a three-dimensional coordinate calculating part calculating a three-dimensional coordinate of each point of the object for each image based on a plurality of images obtained as a result of pictures of the object being taken by said plurality of picture taking parts and a three-dimensional shape composing part expressing, by a coordinate in a single coordinate system, a three dimensional coordinate of each point of the object calculated by said three-dimensional coordinate calculating part for at least two different positions, such as the two locations of the cameras, and to produce a composed image (Figs. 12a-12b; Fig. 11: host computer; col. 6, lines 49-67; Fig. 9; and col. 7, lines 29-63 with col. 2, lines 35-45). Geng does not explicitly state a picture taking position-specifying part but he discloses a geometrical parameter calibration part (col. 7, lines 50-55). Kumar in an imaging system teaches a picture taking position-specifying part, a correction part comprising a position sensor (Fig. 4: 412 and 416). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a position specifying part in order to correct for the position of the camera when calculating three dimensional coordinates of the object being imaged.

As for a computer readable medium for the coordinate calculating and expressing of coordinates, Geng does not explicitly state this, but Geng discloses a host computer (Fig. 11: host computer). And Katayama in an image sensing and processing apparatus teaches software (col. 3, lines 54-60). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that software was used in order to process the data to produce a composed image.

As for **claim 19**, Geng in evidence of Kumar and Katayama discloses everything as above (see **claim 16**). In addition, Geng discloses a three-dimensional image generating part

generating a three-dimensional image of the object in accordance with coordinates of the object obtained and an image obtained when the light having the predetermined pattern is not applied to the object with a sequential projection of individual color bands (Fig. 12a).

As for **claims 31-34**, Geng in evidence of Kumar and Katayama discloses everything as above (see **claims 16 and 20**). In addition, Geng discloses the calculation of attitudes angles, translation and rotational components by a calibration step of geometric parameters and angle and range calculations (col. 7, lines 45-60). In evidence Kumar in an imaging system teaches with calibration the calculation of rotations, translations, and attitudes, position, roll, pan, tilt, and zoom (col. 7, lines 55-67).

8. **Claims 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Geng (6,700,669)** in view of **Kumar et al. (6,522,787)-previously cited** further in view of **Katayama et al. (6,640,004)** further in view of **Kitaguchi et al. (6,038,074)-cited by applicant.**

As for **claims 17-18,** Geng in view of Kumar and in view of Katayama discloses everything as above (see **claim 16**). Geng is silent concerning an acceleration, magnetic, and angular velocity sensor. However, Kitaguchi in a three-dimensional measuring apparatus teaches using an acceleration sensor, magnetic sensor, and angular velocity sensor to detect a rotational angular velocity around each coordinate axis of the three dimensional coordinate system (col. 10, lines 35-45; col. 15, line 15-30; Fig. 25; 186-188; col. 36, lines 1-35). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have an acceleration sensor, magnetic sensor, and angular velocity sensor in order to accurately determine the position of the camera in relation to the object being imaged.

Response to Arguments

9. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection. As for the allowable subject matter set forth in the previous office action, the Examiner apologizes for the inconvenience but upon further search rejections to the claims have been made.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: U.S. Patent 6,438,272 to Huang et al.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: **(571) 273-8300**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gs
May 11, 2006

Gregory J. Toatley, Jr.
Supervisory Patent Examiner
Art Unit 2877
15May06